REMARKS

Claims 2, 5, and 8 have been cancelled. New claims 10-12 have been added. Claims 1, 3, 4, 6, 7, and 9 have been amended. Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made." Thus, claims 1, 3-4, 6-7, and 9-12 are pending.

Claims 1-9 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Oka (U.S. Patent No. 5,912,671). This rejection is respectfully traversed.

The present invention is directed to a three dimensional graphical system which supports rendering of animation objects. The animation objects are rendered using a technique which retains the visual appearance of animated objects. For example, Figs. 7A and 7B illustrate a robot rendered in accordance to two techniques. More specifically, Fig. 7B illustrates a traditional three dimensional rendering of a robot, while Fig. 7A illustrates the animation rendering technique of the invention. The robot rendered in accordance with the invention has a "flatter" appearance and switches cleanly between a "light" texture and a "shadow" shadow texture. In contrast, the traditionally rendered robot has a more three dimensional look and it utilizes a single texture which is modulated in brightness.

The processing performed by the present invention is illustrated by the flowchart of Fig. 4, and described in the specification at pages 9-13. The processing involves determining where the boundary between light and shadow falls on an object and breaking down each polygon which spans the boundary into a plurality of polygons, wherein none of the

plurality of polygons spans the boundary, and applying the "light" texture to each polygon on the light side of the boundary while applying the "shadow" texture to each polygon on the shadow side of the boundary. The polygons which are required to be divided are detected based on a calculation using the inner product function. Accordingly, independent claims 1, 4, and 7 recite dividing polygons which intersect a boundary line, sorting the polygon according to two colors, and applying a corresponding texture to the sorted polygons based on color. More specifically, claim 1 recites:

> dividing polygons intersecting the boundary line along the boundary line; sorting the divided polygons into polygons of the first color part and polygons of the second color part along the boundary line according to the direction of a light source and normal lines of the divided polygons; and pasting up the first mono-color texture on the polygons belonging to the first color part, and the second mono-color texture on the polygons belonging to the second color part;

claim 4 recites:

> dividing polygons intersecting the boundary line along the boundary line, and sorting the divided polygons into polygons of the first color part and polygons of the second color part along the boundary line according to the direction of a light source and normal lines of the divided polygons; and a rendering processor for pasting up the first mono-color texture on the polygons belonging to the first color, part and the second mono-color texture on the polygons belonging to the second color part; and

claim 7 recites:

> dividing polygons intersecting the boundary line along the boundary line; sorting the divided polygons into polygons of the first color part and polygons of the second color part along the boundary line according to the direction of a light source and normal lines of the divided polygons; and pasting up the first mono-color texture on the polygons belonging to the first color part and the second mono-color texture on the polygons belonging to the second color part.

Oka discloses a method and apparatus for a three dimensional rendering system using a raster processor which generates brightness data for points line on the edge of each

polygon by interpolating the color/brightness data of the apexes (vertices) of the polygon. Subsequently, the color/brightness data for interior points are obtained by a second interpolation of the boundary points. The interpolated color/brightness data is then used to modulate the appearance of the of textures during the texture mapping process. See, e.g., column 16, line 63 – column 17, line 14; Fig. 16. Oka therefore fails to disclose the above recited limitations of the independent claims.

Independent claims 1, 4, and 7 each recite dividing polygons which span a boundary into a plurality of divided polygons, wherein each of the divided polygon is sorted into two "colors" and an associated texture is applied to each divided polygon based on the sorted color. The prior art of record is devoid of any teachings or suggestion regarding this feature. Accordingly, claims 1, 4, and 7 are believed to be allowable over the prior art of record. The remaining claims are each dependent from one of claims 1, 4, and 7 and are also believed to be allowable over the prior art of record for these reasons and because the combinations defined in the claims are not shown or suggested by the prior art of record.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue.

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Respectfully submitted,

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Version With Markings to Show Changes Made

Please amend claims 1, 3, 4, 6, 7, and 9.

1. A method of forming a polygon image, comprising the steps of:

obtaining a plurality of polygons having normal line data as apex data and constituting a model;

sorting [the model constituted by] the plurality of polygons into polygons of a first color part and polygons of a second color part [by] along a boundary line[s] [consisting of] according to the direction of a light source and normal lines of the [model;] plurality of polygons;

[pasting up a first mono-color texture on the sorted polygons having the first color part, and pasting up a second mono-color texture on the sorted polygons having the second color part; and]

dividing [the] polygons intersecting the boundary line[s] along the boundary [lines,] line;

sorting the divided polygons into polygons of the first color part and polygons of the second color part along the boundary line according to the direction of a light source and normal lines of the divided polygons; and

pasting up the first mono-color texture on the polygons belonging to the first color part, [out of the divided polygons,] and [pasting up] the second mono-color texture on the polygons belonging to the second color part.

3. The method of forming a polygon image according to claim [2,] 10, wherein [the] intersectional position of [the] a side line of a polygon intersecting [a] the boundary line is acquired from a proportional relation with the inner product values of [of each of] two apexes of [a boundary-line-intersecting] the side line of the polygon intersecting the boundary lines when the inner product value is at the intersectional position is set "0". [0.]

4. An image processing apparatus comprising:

control means for obtaining a plurality of polygons having normal lines [data] as apex data and constituting a model, [the control means] sorting [the model constituted by] the plurality of polygons into polygons of a first color part and polygons of [the] a second color part [by] along a boundary line[s] [consisting of] according to the direction of a light source and normal lines of the divided polygons, [the direction of a light source and normal lines of the model;]

[a rendering processor for pasting up a first mono-color texture on the thus sorted polygons having the first color part, and pasting up a second mono-color texture on the thus sorted polygons having the second color part, and]

dividing [the] polygons intersecting the boundary line[s] along the boundary line[s], and

sorting the divided polygons into polygons of the first color part and polygons of the

second color part along the boundary line according to the direction of a light source and normal lines of the divided polygons; and

a rendering processor for pasting up the first mono-color texture on the polygons belonging to the first color, part [out of the thus divided polygons,] and [pasting up] the second mono-color texture on the polygons belonging to the second color part.

6. The image processing apparatus according to claim [5,] 11 wherein

[the] intersectional position of a side line of a [the boundary-line-intersecting] polygon intersecting [and] the boundary line is acquired from a proportional relation with the inner product values of [each of] two apexes of the [boundary-line-intersecting] side line of the polygon [intersecting the boundary line] when the inner product at the intersectional position is set "0". [0.]

7. A record medium storing a program which is [execution controlled] executed by control means in an image processing apparatus, the program providing a control which comprises the steps of:

obtaining a plurality of polygons having normal line data as apex data and constituting a model;

sorting [the model constituted by] the plurality of polygons into polygons of a first color

part and polygons of a second color part [by] along a boundary line[s] [consisting of] according to the direction of a light source and normal lines of the [model;] plurality of polygons;

[pasting up a first two mono-color textures on the sorted polygons having the first color part, and pasting up a second mono-color texture on the sorted polygons having the second color part; and]

dividing [the] polygons intersecting the boundary line[s] along the boundary line;[s,]

sorting the divided polygons into polygons of the first color part and polygons of the second color part along the boundary line according to the direction of a light source and normal lines of the divided polygons; and

pasting up the first mono-color texture on the polygons belonging to the first color part [of the divided polygons,] and [pasting up] the second mono-color texture on the polygons belonging to the second color part.

9. The record medium having stored therein the program according to claim 12, [8,] wherein [the] intersectional position of [the] a side of a polygon intersecting [with a] the boundary line is acquired from a proportional relation with the inner product values of [each of] two apexes of [a boundary-line-intersecting] the side line of the polygon [intersecting with the boundary lines] when the inner product value[s] at the intersectional position is set "0". [0.]